

Measurement of $^{238}\text{U}(n,xn \gamma)$ cross sections

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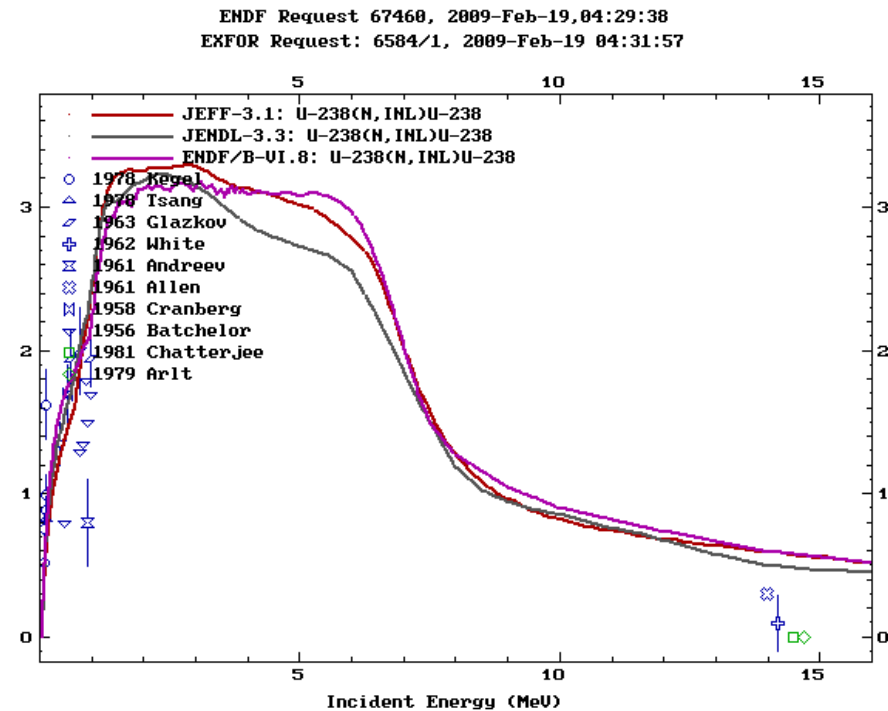
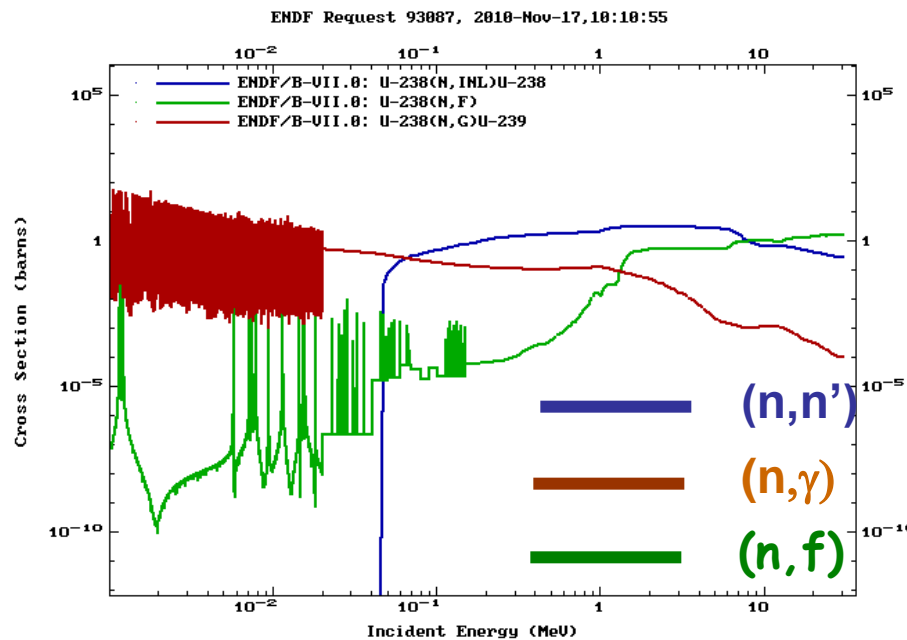
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$^{238}\text{U}(n,n')$ status



Between 50 keV and about 6 MeV, the (n,n') cross section is larger than the fission and capture ones.

Data exist only up to about 1 MeV and have low precision.

Isotope mentioned in the HPRL

NEA Nuclear Data High Priority Request List



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Request ID	18	Status of the request	High Priority request
Target	Reaction and process	Incident Energy	Secondary energy or angle
92-U-238	(n,inel) SIG	65 keV-20 MeV	Emis spec.
Field	Subfield	Date Request created	Date Request accepted
Fission	Fast Reactors EFR,SFR,ABTR...	28-MAR-08	11-SEP-08

Target	Reaction and process	Incident Energy
92-U-238	(n,inel) SIG	65 keV-20 MeV

Send a comment on this request to NEA.

Requester: Prof. Massimo SALVATORES at CADARACHE
Email: massimo.salvatores@cea.fr

Project (context): NEA WPEC Subgroup 26

Impact:
 Design phases of selected reactor and fuel cycle concept margins for both economical and safety reasons. A first made within WPEC Subgroup 26 (SG-26). The assessment systems considered (ABTR, SFR, EPR, GFR, LFR, ADMAB) addressed to meet target accuracy requirements for the accompanying requests originating from SG-26).

The request for improved cross sections and emission spectra issue that emerges for five of the eight cases studied. The GFR and the LFR.

Improvements of the nuclear data for ²³⁸U(n,inel) are in SFR (in order of significance), the peak power of a GFR.

Accuracy:
 Target accuracies are specified per system and per energy of the current (initial) uncertainties.

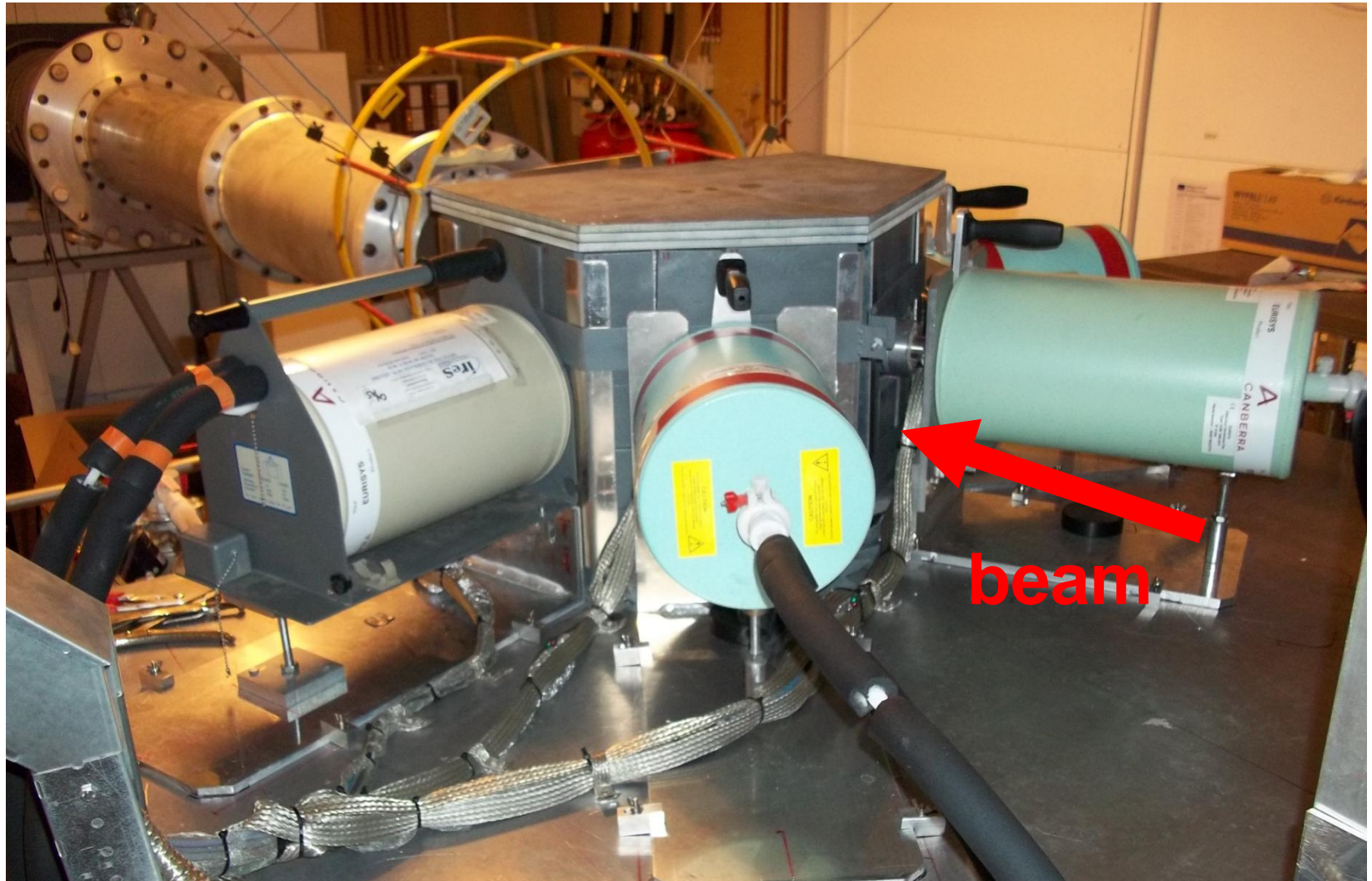
Energy Range	Initial ver	Initial	A
6.07-19.6 MeV	29	1	
2.23-6.07 MeV	20	3	
1.35-2.23 MeV	21	4	
0.498-1.35 MeV	12	7	
67.4-183 keV	11	7	

Accuracy:

Energy Range	Initial versus target uncertainties (%)					
	Initial	ABTR	SFR	EFR	GFR	LFR
6.07-19.6 MeV	29	12			7	
2.23-6.07 MeV	20	3	5	4	2	3
1.35-2.23 MeV	21	4	5	4	2	2
0.498-1.35 MeV	12	7	6	5	2	2
67.4-183 keV	11	7		9	7	4

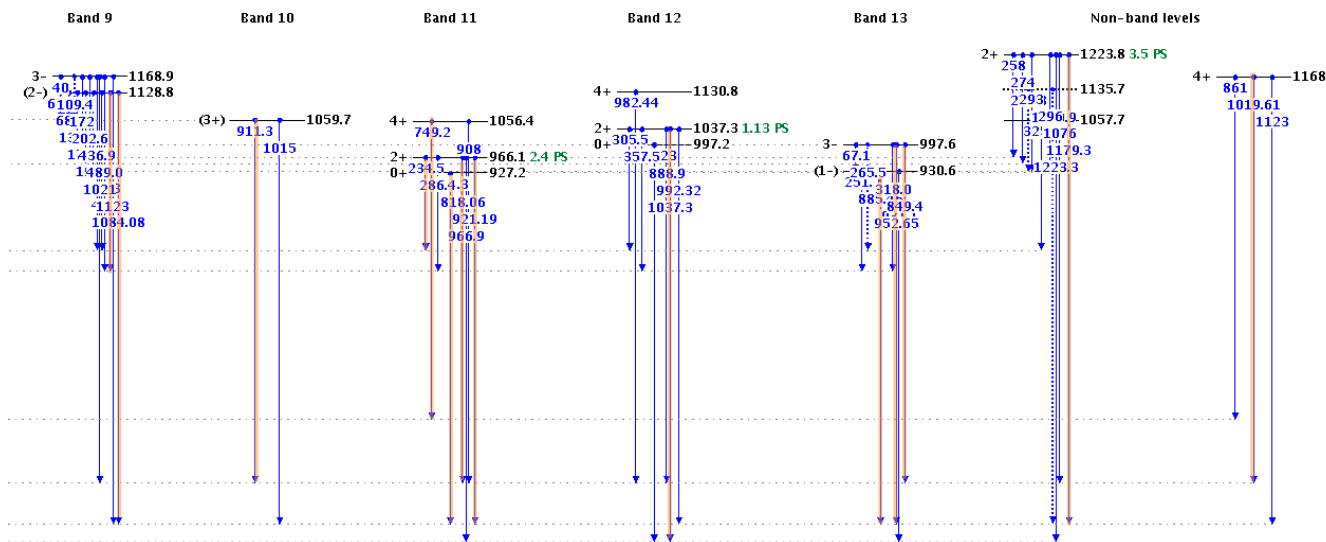
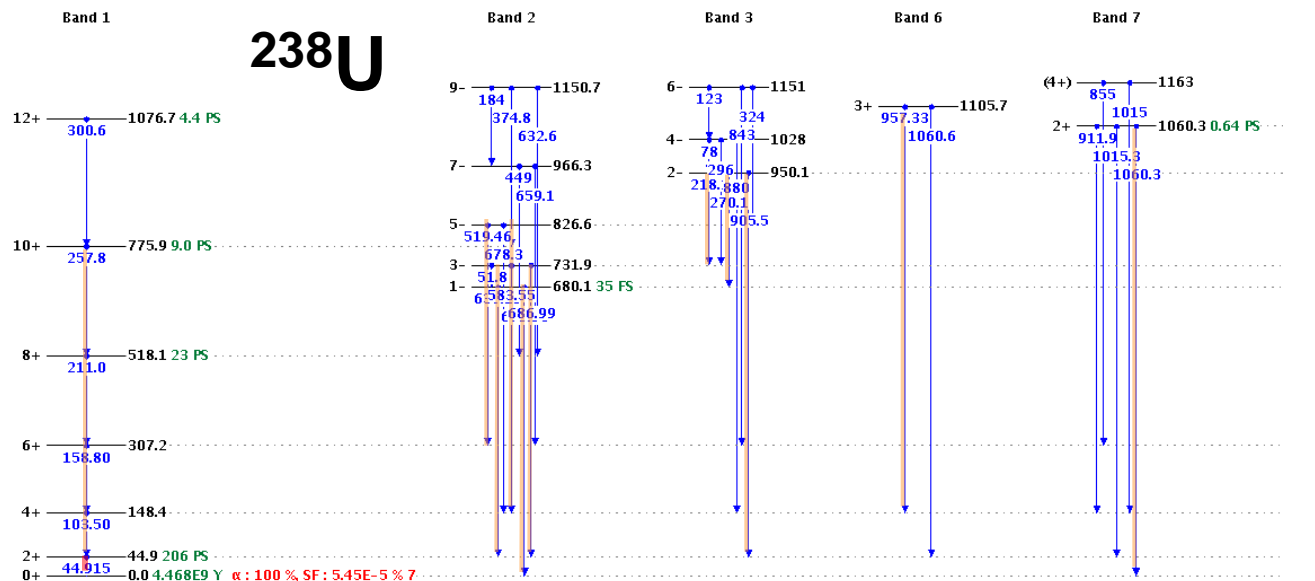
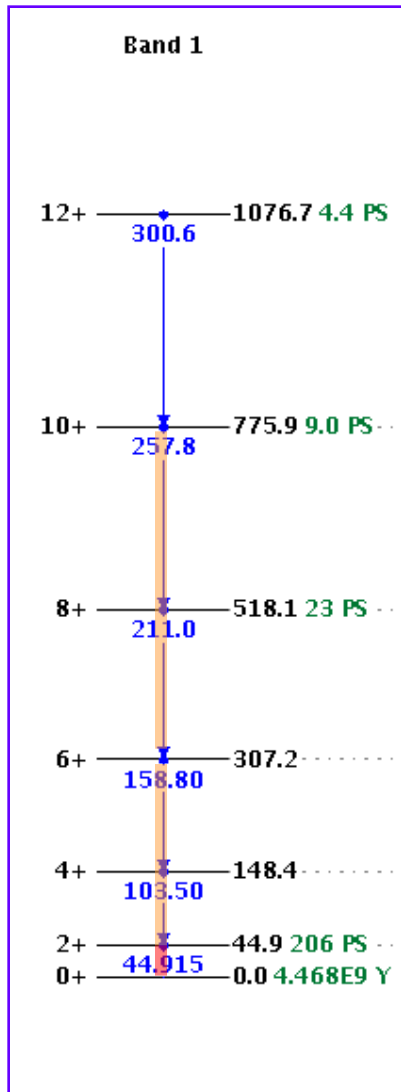
http://www.nea.fr/dbdata/hpml/hpmlview.pl?ID=435[19/10/2010 11:36:04]

Experimental set-up



Preliminary results : level scheme

^{238}U



$^{238}\text{U}_{146}$

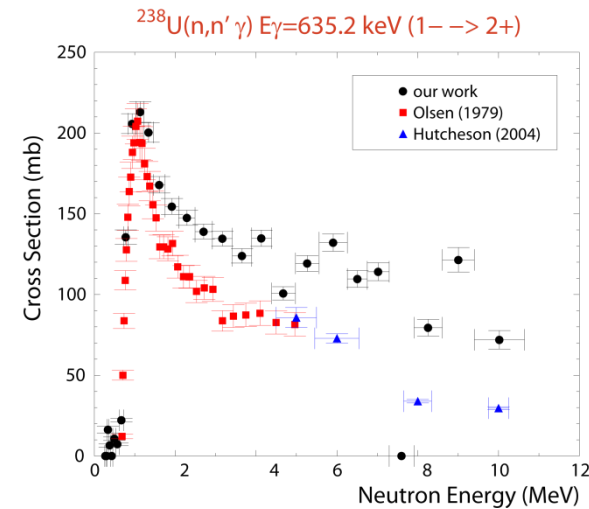
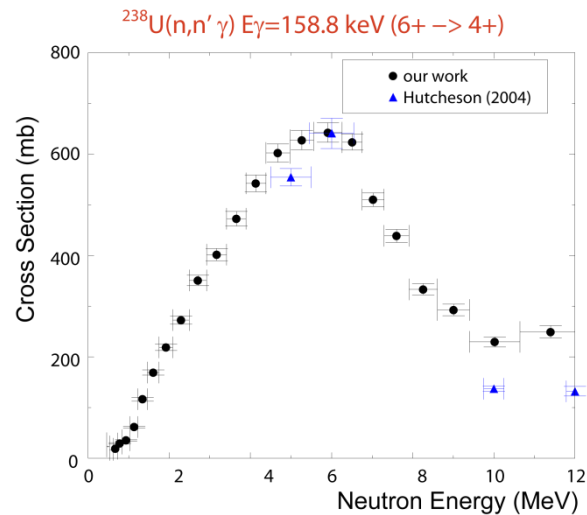
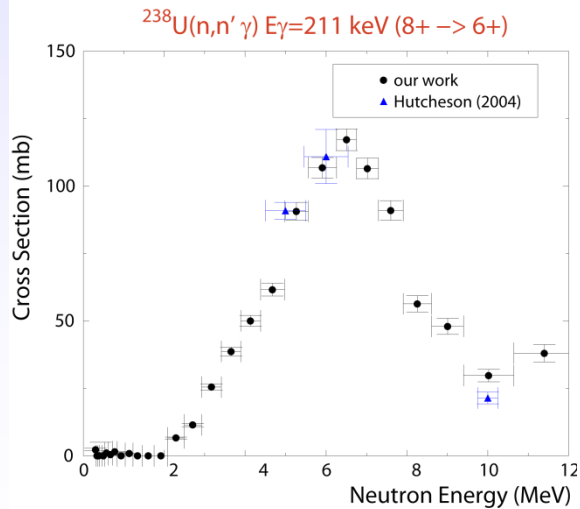
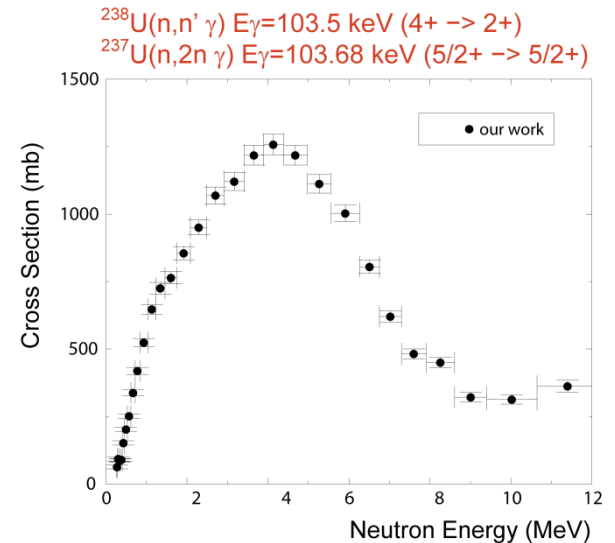
Measurement: preliminary results

Up to now :

-> **885** hours of beam (in may 2011 448 h)

-> **analysis in progress:**

number of observed transitions ~ 30
gamma energy distributions
preliminary cross sections



Conclusions

@ CDD for 18 months at IPHC

Antoine Bacquias has started in April 2011

@ Set up :

* Try to optimize the set-up in order to minimize the contribution of the Pb X rays and thus increase the ratio signal/background in the 20-80 keV energy range (hope to measure the cross section for the first level at 45.9 keV in 238U)

@ Theoretical aspects

- * Collaboration with A.J. Koning (NRG, Petten) and S. Hilaire, P. Romain (CEA, Bruyères le Châtel) for TALYS calculations
- * Collaboration with M. Sin (University of Bucharest), R. Capote (IAEA) for EMPIRE calculations